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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/734,948
Filing Date: December 11, 2003
Appellant(s): KAMIMURA ET AL.

Jiawei Huang
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 13 March 2006. This Examiner's Answer replaces the Examiner's Answer mailed 12-11-2006.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,092,138	RADERMACHER ET AL.	3-1992
5,736,063	RICHARD ET AL.	4-1998
6,178,761 B1	KARL	1-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Richard et al (5,736,063). Richard et al discloses non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant. Example 51 in Table 2 discloses a specific refrigerant composition containing carbon dioxide and a combustible hydrocarbon, propane. Example 27 in Table 2 discloses a specific refrigerant composition containing carbon dioxide and a combustible HFC refrigerant, HFC-32. As best understood, these non-azeotropic mixtures inherently exhibit a temperature glide, wherein the temperature glide can produce a first temperature range between a beginning of an evaporation and an intermediate temperature for use as a refrigeration range, and a second temperature range from the intermediate temperature to a temperature at an ending of the evaporation for use as a cold storage temperature range.

Claims 4-,7/4 and 8/7/4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radermacher et al (5,092,138) in view of Richard et al (5,723,063). Radermacher et al disclose, with particular reference to the figure, a refrigerating device comprising a refrigerating cycle in which a compressor 4, a heat radiator (condenser 5), a expansion mechanism (not labeled, but depicted schematically at the bottom of the figure), and an evaporator (low temperature evaporator 1) are connected by a refrigerant path. It is further shown that there is a second evaporator (high-temperature

evaporator 2) in series connection with the low-temperature evaporator 1, and an auxiliary heat exchanger 3 that is arranged between the outlet side of the heat radiator 5 and the inlet side of the expansion mechanism and between the outlet side of the evaporator 2 and the inlet side of the compressor 4. Although the refrigerating device disclosed by Radermacher et al uses mixed refrigerants, (see columns 2 and 3), some of which contain the ozone-depleting HCFC, chlorodifluoromethane (also known as HCFC-22 or R-22), the reference fails to disclose the carbon dioxide refrigerant mixture required by the claims. Richard et al teaches the use of non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant , as already discussed above regarding claims 1-3. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of applicants' invention to use in the refrigerating system disclosed by Radermacher et al, the refrigerant compositions taught by Richard et al, as Richard et al teach that such compositions are suitable replacements for chlorodifluoromethane (column 3, lines 31-32) that will not deplete the ozone layer.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (6178761 B1) in view of Richard et al. (US-5723063). Karl discloses a refrigerating cycle that uses a carbon dioxide refrigerant comprising a compressor 4, a heat radiator 8, an expansion mechanism 10, and an evaporator 11, all of which are connected by a refrigerant path. It is disclosed that the refrigerant used in this system is subjected to a supercritical state (column 1, line 66) inherently at a high-pressure side of the evaporator, which as best understood, is equivalent to a "hyper critical state," as recited

by the claim. Karl fails to disclose the use of the mixed refrigerant required by the claim. Richard et al. teach the use of non-azeotropic refrigerant compositions containing carbon dioxide and at least one kind of combustible refrigerant as already discussed above regarding claims 1-3. Accordingly, it would have been obvious to one of ordinary skill in the art to use the refrigerant mixture taught by Richard et al. in the system disclosed by Karl because the refrigerant mixture is intended for use in vapor-compression refrigerating cycles, such as the one disclosed by Karl, and such a refrigerant mixture is an environmentally safe refrigerant.

Claims 7/5 and 8/7/5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (6,178,761) in view of Richard et al. (5,723,063) as applied to claim 5 above, and further in view of Radermacher et al. (5,092,138). The combination of Karl and Richard et al., as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator that are connected by a refrigerant path, in which a non-azeoptropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate a plurality of evaporators, wherein a low temperature evaporator and a high temperature evaporator are arranged in series, as required by the claims. Radermacher et al. teach a refrigeration device using a mixed refrigerant working fluid that comprises a low-temperature evaporator 1 arranged in series with a high-temperature evaporator 2. It would have been obvious to one of ordinary skill in the art to modify the refrigeration system demonstrated by the combination of Karl and Richard et al. to include the plurality of evaporators taught by

Radermacher et al. because Radermacher et al. teach that such an arrangement can be used in devices wherein two separate compartments can be kept at different temperatures (column 2, lines 26-29). Claim 8 requires an auxiliary heat exchanger specifically placed in the refrigeration ~circuit. Karl already discloses such a heat exchanger E.

Claim 6 is rejected Under 35 U.S.C. 103(a) as being unpatentable over Karl (6,178,761) in view of Richard et al. (5,723,063) and Vander Woude et al. (6,631,621). The combination of Karl and Richard et al., as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator that are connected by a refrigerant path, in which a non-azeoptropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate that the evaporator is operated at the triple point of carbon dioxide as required by the claim. Vander Woude et al. teaches a refrigerating system, which can use carbon dioxide as the cryogen (refrigerant), wherein there is an evaporator coil 42 for vaporizing the cryogen. It is taught by Vander Woude et al. that preferably the evaporator coil is maintained (by a pressure regulator) at a state equal to or slightly above the triple point of the refrigerant. See column 5, lines 29-35. It would have been obvious to one of ordinary skill in the art to operate the evaporator demonstrated by the combination of Karl and Richard et al. at the triple point of carbon dioxide taught by Vander Woude et al. because, as understood, the triple point represents the lowest temperature and

pressure at which the refrigerant can exist in the liquid phase and therefore provide the greatest cooling power in the evaporator.

Claims 7/6 and 8/7/6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl (6,178,761) in view of Richard et al. (5,723,063) and Vander Woude et al. (US-6631621 B2) as applied to claim 6 above, and further in view of Radermacher et al. (US-5092138). The combination of Karl, Richard et al. and Vander Woude et al, as already discussed above, demonstrates a refrigerating system comprising a heat radiator, an expansion mechanism, and an evaporator, operated at the triple point of carbon dioxide, that are connected by a refrigerant path, in which a non-azeoptropic mixture comprising carbon dioxide and at least one kind of combustible refrigerant is used and subjected to a supercritical state. The combination fails to demonstrate a plurality of evaporators, wherein a low temperature evaporator and a high temperature evaporator are arranged in series, as required by the claims. Radermacher et al. teach a refrigeration device using a mixed refrigerant working fluid that comprises a low-temperature evaporator 1 arranged in series with a high-temperature evaporator 2. It would have been obvious to one of ordinary skill in the art to modify the refrigeration system demonstrated by the combination of Karl, Richard et al., and Vander Woude et al. to include the plurality of evaporators taught by Radermacher et al. because Radermacher et al. teach that such an arrangement can be used in devices wherein two separate compartments can be kept at different temperatures (column 2, lines 26-29). Claim 8 requires an auxiliary heat exchanger specifically placed in the refrigeration circuit. Karl already discloses such a heat exchanger E.

(10) Response to Argument

In regard to claims 1-3:

Claim 1 is directed to a composition of matter, specifically a non-azeotropic refrigerant composition comprising carbon dioxide and at least one kind of combustible refrigerant and having a temperature glide. Claim 2 requires the combustible refrigerant of claim 1 to be a hydrocarbon. Claim 3 requires the combustible refrigerant of claim 1 to be a HFC refrigerant. The instant application expressly describes examples of compositions in paragraph [0017] of the written description, which recites, "the non-azeotropic refrigerant mixture of the present invention comprises carbon dioxide and at least one kind of combustible refrigerants. The combustible refrigerant can be hydrocarbon series combustible refrigerant (such as ethane, propane, propylene, butane, isobutene and pentane, etc.) or HFC series combustible refrigerant (such as R32, R152a, and R14, etc.)"

Richard et al. disclose a non-azeotropic refrigerant having a temperature glide comprising carbon dioxide and a combustible refrigerant that can be either a hydrocarbon or an HFC refrigerant. In particular, example 27 from Table 6 discloses a refrigerant mixture comprising carbon dioxide and HFC-32 (i.e. R32). Example 51 discloses a refrigerant mixture comprising carbon dioxide and propane. Since the refrigerant mixtures disclosed by Richard et al. are compositionally identical to the ones of the present invention, the reference of Richard et al. is considered to anticipate the claims.

Although Appellant does not dispute that Richard et al. disclose refrigerant mixtures comprising carbon dioxide and at least one kind of combustible refrigerant as claimed, Appellant asserts that claims 1-3 are improperly rejected under 35 U.S.C. 102(b) because Richard et al. fails to expressly disclose that the temperature glide of the mixture "produces a first temperature range between a beginning temperature and an intermediate temperature in an evaporation process for use as a refrigeration area, and a second temperature range from the intermediate temperature to a temperature at an ending of the evaporation of the evaporation process for use as a cold storage area," as recited by claim 1. This recitation, however, merely reflects an intended use for the claimed composition derived from its properties, and it fails to provide any compositional distinction between the refrigerant mixture being claimed and the refrigerant mixtures disclosed by Richard et al. In other words, while Appellant has devised a method for using a property of a non-azeotropic refrigerant mixture to produce two temperature ranges in order to increase refrigeration performance, the claimed refrigerant mixture itself is not novel. Although Richard et al. do not explicitly disclose the recited use for the refrigerant mixture, an anticipatory prior art reference need not disclose the utility of a composition as long as it identically discloses the claimed composition. *In re Schoenwald*, 964 F.2d 1122, 22 USPQ2d 1671 (Fed. Cir. 1992). Furthermore, the discovery of a new property of a prior art composition does not render the old composition patentably new to the discoverer. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Appellant further argues that Richard et al. do not teach the equivalent structural design of the refrigerator having a

"refrigeration area" and a "cold storage area." Again, the recitation of the refrigeration area and the cold storage area does nothing to distinguish the actual composition being claimed from the compositions disclosed by Richard et al. and is merely indicative of the composition's intended use. Accordingly, since Richard et al. disclose refrigerant mixtures that are compositionally identical to the present invention, it is respectfully submitted that the rejection of claims 1-3 under 35 U.S.C. 102 is proper.

In regard to claims 4-8:

Claims 4-8 ultimately depend from claim 1 and are directed to refrigerating cycles in which the refrigerant mixture of claim 1 is circulated. Claims 4, 7/4, and 8/7/4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radermacher et al. in view of Richard et al. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karl in view of Richard et al. Claims 7/5 and 8/7/5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl in view of Richard et al. as applied to claim 5 and further in view of Richard et al. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karl in view of Richard et al. and VanderWoude et al. Claims 7/6 and 8/7/6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karl in view of Richard et al. and VanderWoude et al. as applied to claim 6 and further in view of Radermacher et al.

The prior art references of Radermacher et al., Karl, and VanderWoude et al. demonstrate that all the features of the claimed refrigerating cycles minus the specific refrigerant mixture are already known in the art, which Appellant has not disputed. Accordingly, claims 4-8 are considered unpatentable over the combination of these

references with the teachings of Richard et al. who disclose the claimed refrigerant mixture. Appellant, however, asserts that claims 4-8 are improperly rejected under 35 U.S.C. 103(a) because Appellant maintains that neither Richard et al. nor the other cited references disclose that the refrigerant mixture temperature glide produces "the refrigeration area" and "the cold storage area" as recited in claim 1. As discussed above, this recitation reflects an intended use for the refrigerant mixture but fails to compositionally distinguish the claimed refrigerant mixture from the refrigerant mixtures taught by Richard et al. Therefore it is respectfully submitted that the presented combinations of references contain all the elements of claims 4-8 and the rejections of these claims under 35 U.S.C. 103(a) are proper.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

(12) Conclusion

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/William C Doerrler/
Primary Examiner, Art Unit 3744

WCD
December 10, 2008

Conferees
Cheryl J. Tyler /Cheryl J. Tyler/
Supervisory Patent Examiner, Art Unit 3744

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(Original Appeal conference attended by Richard Leung, who prepared the original Examiner's Answer- He has since left the Office)

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